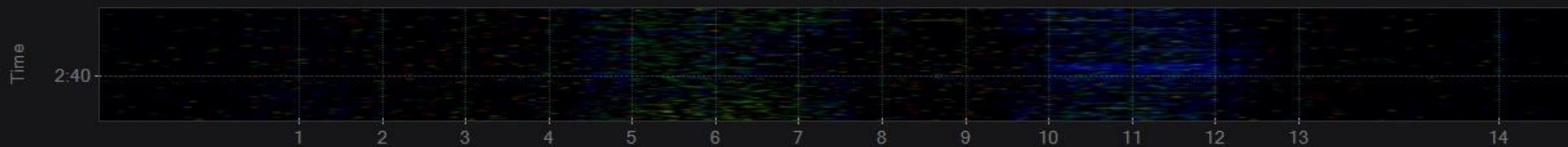
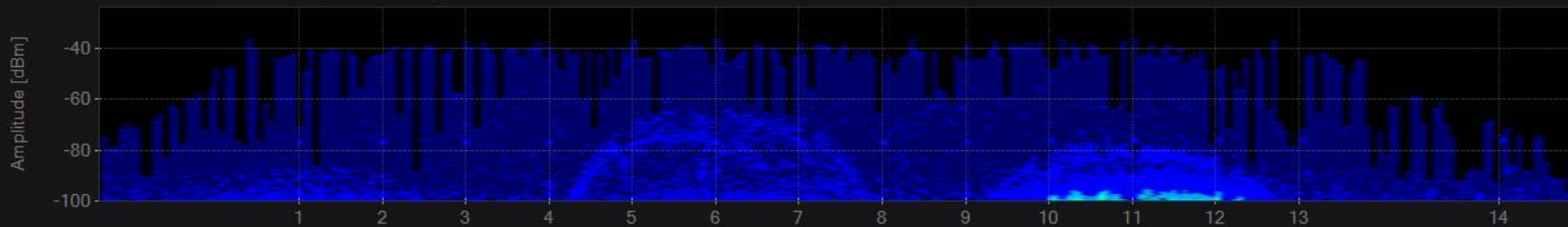


# Privatnost i zaštita podataka na Wi-Fi mreži





☐ CURRENT 
 ☒ AVERAGE 
 ☐ MAX 
 ☐ % DENSITY 
 ☒ NETWORKS 
 ☐ INSPECTOR



☐ Learn 
 ☒ Interferers 
 ☐ Channels Table 
 ☒ Networks Table 
 ☐ Networks Graph 
 ☐ % Utilization Graph 
 ☐ Notes

☒ Physical
 ☐ Logical

FILTERS
 
☐ - ☒ +
 

☐ < ☒ >

|  | Radio MAC         | AP Alias | SSIDs            | Channel | Signal Strength (dBm) | BSSID Count | Security        | Max Rate (Mbps) | Vendor               |         |
|--|-------------------|----------|------------------|---------|-----------------------|-------------|-----------------|-----------------|----------------------|---------|
|  | 08:96:D7:B6:56:AD |          | FRITZ!Box Fon WL | 1       | -86                   | 1           | WPA2-Personal   | 300,0           | AVM GmbH             | b. g. n |
|  | 1C:7E:E5:35:EF:36 |          | Dlin1            | 1       | -74                   | 1           | WPA2-Personal   | 54,0            | D-Link International | b. g    |
|  | D4:CA:6D:A3:6E:69 |          | OSPodmurvice     | 1+5     | -85                   | 1           | WPA2-Personal   | 300,0           | Routerboard.com      | b. g. n |
|  | 78:8C:54:00:FE:A7 |          | ISKONOVAC-00FE   | 1       | -88                   | 1           | WPA2-Personal   | 54,0            | Eltek Technologies   | b. g    |
|  | 00:14:7F:AF:95:EB |          | ISKadm           | 1       | -84                   | 1           | WPA2-Personal   | 54,0            | Thomson Telecom      | b. g    |
|  | 64:66:B3:CC:49:0A |          | Dlin1            | 1+5     | -82                   | 1           | WPA2-Personal   | 300,0           | TP-LINK TECHNOI      | b. g. n |
|  | 10:FE:ED:09:9E:34 |          | E-Dnevnik        | 1+5     | -84                   | 1           | WPA2-Personal   | 150,0           | TP-LINK TECHNOI      | b. g. n |
|  | C0:4A:00:4E:52:F0 |          | E-Dnevnik        | 6-2     | -85                   | 1           | WPA2-Personal   | 150,0           | TP-LINK TECHNOI      | b. g. n |
|  | 00:26:24:C0:A7:9B |          | Thom_D009314     | 6       | -87                   | 1           | WPA2-Personal   | 54,0            | Thomson Inc.         | b. g    |
|  | C0:4A:00:6B:7B:12 |          | E-Dnevnik        | 6-2     | -87                   | 1           | WPA2-Personal   | 150,0           | TP-LINK TECHNOI      | b. g. n |
|  | 00:4F:81:00:5E:CC |          | Dlin1            | 6+10    | -77                   | 1           | WPA2-Personal   | 150,0           |                      | b. g. n |
|  | 64:66:B3:CC:4B:09 |          | Dlin1            | 6-2     | -60                   | 1           | WPA2-Personal   | 300,0           | TP-LINK TECHNOI      | b. g. n |
|  | 84:C9:B2:63:1A:D2 |          | SSER             | 11      | -85                   | 1           | WPA2-Enterprise | 54,0            | D-Link International | b. g    |

CAPTURE

VISUALIZE

ANALYZE

PACKETS

Radio ☒ ESSID **FILTERS** ☒ + SSID or AP Vendor ☒ - ☒ + Client Vendor ☒ - ☒ + MAC Address Channel ☒ > Data Rate ☒ > RSSI Subframe ☐ Show

AIR TIME

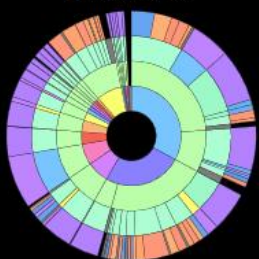
BYTES

PACKETS

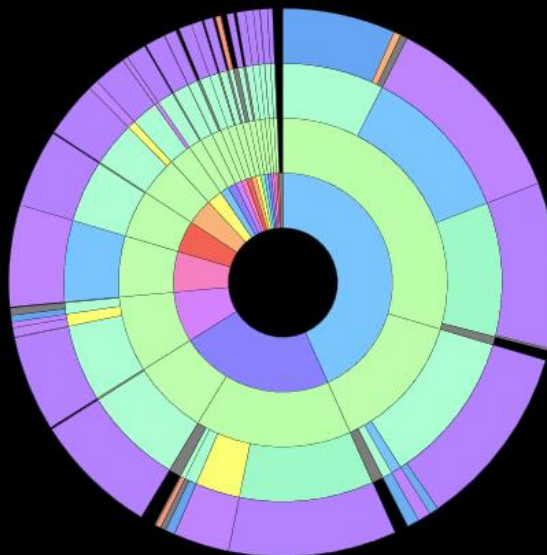
PREPIES



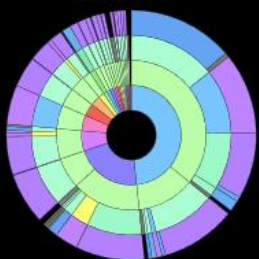
PACKETS ▶



AIR TIME



BYTES ▶



ACTIVE SELECTION



Air Time: 21.149.63 ms  
Bytes: 2.786.964  
Packets: 13.737  
SSIDs: 42  
Clients: 67  
Retry Rate: 38%

Data Rates by Percentage



ASSOCIATED DATA

| ESSID    | Air Time | BSSIDs | Clients |
|----------|----------|--------|---------|
| Broadcom | 1.267    | 1      | 1       |

CAPTURE

VISUALIZE

ANALYZE

PACKETS

Radio

• ESSID

FILTERS



SSID or AP Vendor



Client Vendor



MAC Address

Channel



Data Rate



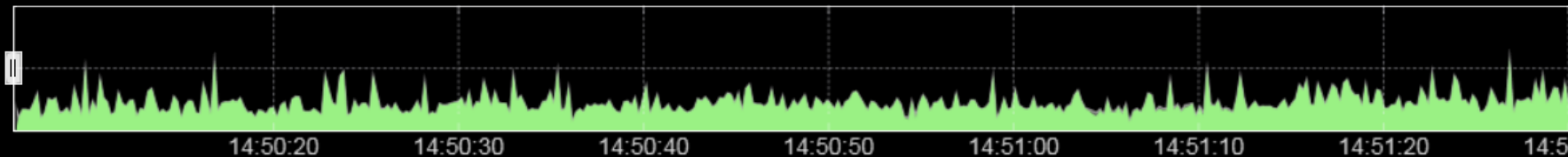
RSSI

Sub

AIR TIME

BYTES

PACKETS



PACKETS

| Subframe Type  | BSSID             | Transmitter Address | Client            | Client Vendor                 |
|----------------|-------------------|---------------------|-------------------|-------------------------------|
| Data           | 00:4F:81:00:5E:CC | 00:4F:81:00:5E:CC   | FF:FF:FF:FF:FF:FF | Broadcast                     |
| Beacon         | 00:4F:81:00:5E:CC | 00:4F:81:00:5E:CC   | FF:FF:FF:FF:FF:FF | Broadcast                     |
| Beacon         | 64:66:B3:CC:4B:09 | 64:66:B3:CC:4B:09   | FF:FF:FF:FF:FF:FF | Broadcast                     |
| Probe Response | C0:4A:00:6B:7B:12 | C0:4A:00:6B:7B:12   | 78:4B:87:59:6D:B8 | Murata Manufacturing Co.,Ltd. |
| Probe Response | C0:4A:00:6B:7B:12 | C0:4A:00:6B:7B:12   | 78:4B:87:59:6D:B8 | Murata Manufacturing Co.,Ltd. |
| Probe Response | C0:4A:00:6B:7B:12 | C0:4A:00:6B:7B:12   | 78:4B:87:59:6D:B8 | Murata Manufacturing Co.,Ltd. |
| Beacon         | 64:66:B3:CC:4B:09 | 64:66:B3:CC:4B:09   | FF:FF:FF:FF:FF:FF | Broadcast                     |
| Beacon         | 40:F3:08:CF:D9:FD | 40:F3:08:CF:D9:FD   | FF:FF:FF:FF:FF:FF | Broadcast                     |
| ACK            | 00:00:00:00:00:00 | FF:FF:FF:FF:FF:FF   | 00:0C:F4:01:F0:E3 | AKATSUKI ELECTRIC MFG.CO.,L   |
| RTS            | 64:66:B3:CC:4B:09 | 64:66:B3:CC:4B:09   | 00:0C:F4:01:F0:E3 | AKATSUKI ELECTRIC MFG.CO.,L   |
| ACK            | 00:00:00:00:00:00 | FF:FF:FF:FF:FF:FF   | 00:0C:F4:01:F0:E3 | AKATSUKI ELECTRIC MFG.CO.,L   |
| RTS            | 64:66:B3:CC:4B:09 | 64:66:B3:CC:4B:09   | 00:0C:F4:01:F0:E3 | AKATSUKI ELECTRIC MFG.CO.,L   |
| QoS Data       | 64:66:B3:CC:4B:09 | 64:66:B3:CC:4B:09   | 00:0C:F4:01:F0:E3 | AKATSUKI ELECTRIC MFG.CO.,L   |
| ACK            | 00:00:00:00:00:00 | FF:FF:FF:FF:FF:FF   | 00:0C:F4:01:F0:E3 | AKATSUKI ELECTRIC MFG.CO.,L   |
| ACK            | 00:00:00:00:00:00 | FF:FF:FF:FF:FF:FF   | 00:0C:F4:01:F0:E3 | AKATSUKI ELECTRIC MFG.CO.,L   |
| QoS Data       | 64:66:B3:CC:4B:09 | 64:66:B3:CC:4B:09   | 00:0C:F4:01:F0:E3 | AKATSUKI ELECTRIC MFG.CO.,L   |
| ACK            | 00:00:00:00:00:00 | FF:FF:FF:FF:FF:FF   | 00:0C:F4:01:F0:E3 | AKATSUKI ELECTRIC MFG.CO.,L   |

ACTIVE

1 Mbps

TREEPI





filter:  Expression... Clear Apply Save

| No. | Time     | Source            | Destination               | Protocol | Length | Info |
|-----|----------|-------------------|---------------------------|----------|--------|------|
| 1   | 0.000000 | Tp-LinkT_cc:4b:09 | (TAAkatsuki_01:f0:e3 (RA) | 802.11   |        | 46   |
| 2   | 0.002416 | Tp-LinkT_cc:4b:09 | (TAAkatsuki_01:f0:e3 (RA) | 802.11   |        | 46   |
| 3   | 0.009500 | Tp-LinkT_cc:4b:09 | (TAAkatsuki_01:f0:e3 (RA) | 802.11   |        | 46   |
| 4   | 0.010624 | Tp-LinkT_cc:4b:09 | (TAAkatsuki_01:f0:e3 (RA) | 802.11   |        | 46   |
| 5   | 0.012011 |                   | Akatsuki_01:f0:e3 (RA)    | 802.11   |        | 40   |
| 6   | 0.013137 | Tp-LinkT_cc:4b:09 | (TAAkatsuki_01:f0:e3 (RA) | 802.11   |        | 46   |
| 7   | 0.014259 |                   | Akatsuki 01:f0:e3 (RA)    | 802.11   |        | 40   |

[Number of per-protocol-data: 3]  
 [IEEE 802.11 wireless LAN, key 1]  
 [IEEE 802.11 wireless LAN, key 1]  
 [IEEE 802.11 wireless LAN, key 1]

#### Radiotap Header v0, Length 26

Header revision: 0  
 Header pad: 0  
 Header length: 26  
 Present flags  
 MAC timestamp: 6894310  
 Flags: 0x10  
 Data Rate: 5,5 Mb/s  
 Channel frequency: 2437 [BG 6]  
 Channel type: 802.11b (0x00a0)  
 SSI Signal: -49 dBm  
 SSI Noise: -82 dBm  
 Antenna: 0  
 SSI Signal: 33 dB

#### IEEE 802.11 Request-to-send, Flags: .....C

Type/Subtype: Request-to-send (0x001b)  
 Frame Control Field: 0xb400  
 .000 0001 1011 1001 = Duration: 441 microseconds

# WEP



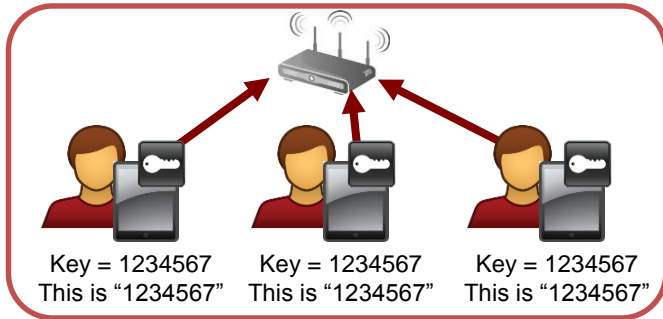
# WPA2





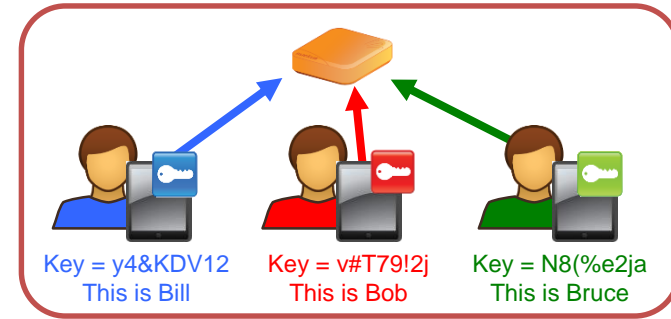
## TRADITIONAL PSK

shared PSK for all devices



## Ruckus Dynamic PSK

unique PSK for each device (Ruckus)



| Benefit  | PSK | 802.1X | Dynamic PSK |
|--|-----|--------|-------------|
| Easy to setup, easy to use                                   | ✓   |        | ✓           |
| Credential method that everyone understands                  | ✓   |        | ✓           |
| Easy to configure end-user devices                           | ✓   |        | ✓           |
| Supported by all client device types                         | ✓   |        | ✓           |
| Does not require RADIUS server or certificate authority      |     | ✓      | ✓           |
| Unique credential for each user                              |     | ✓      | ✓           |
| Strong authentication* and encryption                        |     | ✓      | ✓           |
| Easy to add, delete, and re-provision individual credentials |     | ✓      | ✓           |
| Ties an individual user or device to a credential            |     | ✓      | ✓           |
| Valid users cannot decrypt data from other valid users       |     |        |             |

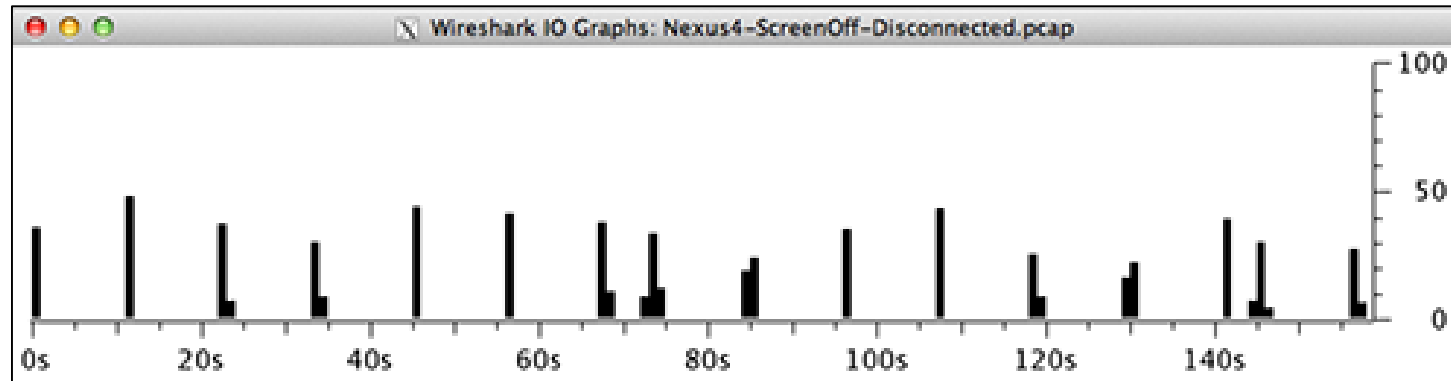


eduroam<sup>TM</sup>

802.1X







```
Sep 7 12:35:30 KARMA: Probe Request from 98:f0:ab:51:4f:14 for SSID 'BTHub3-PXQC'
Sep 7 12:35:02 KARMA: Probe Request from 0c:d2:92:c4:23:68 for SSID 'Hermit'
Sep 7 12:34:36 KARMA: Probe Request from 50:b7:c3:59:90:7a for SSID 'Hermit'
Sep 7 12:23:52 KARMA: Probe Request from 40:f3:08:c2:a0:52 for SSID 'Hermit'
Sep 7 12:19:02 KARMA: Probe Request from f4:37:b7:b9:00:f9 for SSID 'SKY53711'
Sep 7 12:16:57 KARMA: Probe Request from 04:15:52:98:5d:25 for SSID 'BTHub3-PXQC'
Sep 7 12:13:01 KARMA: Probe Request from 98:f0:ab:51:4f:14 for SSID '_The Cloud X'
Sep 7 12:10:35 KARMA: Successful association of b4:07:f9:ef:15:ec
Sep 7 12:10:35 KARMA: Checking SSID for start of association, pass through 02 Public WiFi
Sep 7 12:10:35 KARMA: Probe Request from b4:07:f9:ef:15:ec for SSID '02 Public WiFi'
Sep 7 12:10:35 KARMA: Probe Request from b4:07:f9:ef:15:ec for SSID 'Costa WiFi'
Sep 7 12:10:35 KARMA: Probe Request from b4:07:f9:ef:15:ec for SSID 'BT OpenZone'
Sep 7 12:10:35 KARMA: Probe Request from b4:07:f9:ef:15:ec for SSID 'The Cloud'
Sep 7 12:10:35 KARMA: Probe Request from b4:07:f9:ef:15:ec for SSID 'Free WiFi'
Sep 7 12:09:42 KARMA: Probe Request from 64:20:0c:7c:d6:6b for SSID 'SKY5D1ED'
Sep 7 12:06:35 KARMA: Probe Request from 6c:f3:73:68:fa:67 for SSID 'SKY1079B'
Sep 7 11:07:56 KARMA: Probe Request from 94:44:44:31:d7:c9 for SSID 'SKY38446'
Sep 7 10:54:11 KARMA: Probe Request from d0:22:be:ab:da:e4 for SSID 'BTHub3-R265'
Sep 7 10:47:36 KARMA: Probe Request from c0:63:94:0b:0a:7f for SSID 'BTHub3-GK8H'
Sep 7 10:47:01 KARMA: Probe Request from a0:e4:53:d5:ab:f1 for SSID 'Sheldon 5'
Sep 7 10:39:10 KARMA: Probe Request from 5c:2e:59:28:5e:5d for SSID 'SKY65656'
Sep 7 10:38:23 KARMA: Probe Request from ac:36:13:0c:1b:97 for SSID 'TALKTALK-890F36'
Sep 7 10:10:43 KARMA: Probe Request from f0:db:f8:79:66:53 for SSID 'SKY65656'
Sep 7 10:08:18 KARMA: Probe Request from 50:2e:5c:cd:5f:7e for SSID 'Sheldon 5'
Sep 7 09:59:37 KARMA: Successful association of a0:f3:c1:07:c9:d8
Sep 7 09:59:37 KARMA: Checking SSID for start of association, pass through Penny 2.4
Sep 7 09:59:37 KARMA: Probe Request from a0:f3:c1:07:c9:d8 for SSID 'Penny 2.4'
Sep 7 09:58:53 KARMA: Probe Request from f4:1b:a1:70:cc:dc for SSID 'SKY38446'
Sep 7 09:57:34 KARMA: Probe Request from b0:9f:ba:bc:d9:32 for SSID 'SKY38446'
Sep 7 09:31:01 KARMA: Probe Request from bc:20:a4:79:35:f2 for SSID 'Hermit'
Sep 7 09:17:45 KARMA: ENABLED
```



See All The Things



